

BLACK CARBON AND PM_{2.5} TRANSPORT BETWEEN SANTIAGO DE CHILE AND THE ANDES MOUNTAINS

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Near Santiago de Chile, and towards the Andes Mountains there are several areas sensitive to contamination, such as the Farellones sky resort, the Natural Sanctuary Yerba Loca and several glaciers. To study the influence of Santiago's contamination on the glaciers continuous black carbon and PM_{2.5} monitors as well as meteorological stations have been placed in the city, near the glaciers and in an intermediate point. The results indicate that during the afternoon there is an increase in black carbon that is probably coming from the city, however, at night there is a second peak which is most likely due to local emissions. PM_{2.5} shows a similar increase during the afternoon but not an increase at night.

Santiago de Chile has about 6 million inhabitants and it is located in a valley surrounded by the Andes mountains on the east side and several high hills on the west and north side. Like most cities surrounded by mountains, pollution levels in Santiago are very high in winter because of low wind speeds and strong temperature inversions. The climate is semi-arid with an annual precipitation of only 300 mm and the city relies strongly on water from the Andes coming from snow thaw and dams. There are several mountain glaciers that also provide water for the city and agriculture. Thus, near Santiago there are areas sensitive to contamination such as Natural Sanctuary Yerba Loca and glaciers La Paloma, Olivares Alpha, Olivares Beta and Esmeralda. Very close to the glaciers, there are two copper mines which are also large sources of pollution.

In this work the transport of black carbon and PM_{2.5} has been studied using instruments located in a place near the glacier, in the city and an intermediate site. Near the glacier, an optical instrument was used to measure BC, a DustTrak from TSI was used to measure PM_{2.5} and a meteorological station was used to measure wind speed and direction. Similar instruments were used in the other sites. Measurements took place between December 2014 and May 2015. For both contaminants, a clear peak is seen in all months during the afternoon (3 – 6 pm) and at night (9 – 11 pm) a peak is seen for BC but not for PM_{2.5}. The results suggest that PM_{2.5} and BC are transported from the city towards the mountains during the afternoon. But during the night BC is generated locally.